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EXAMINER

OWENS, DOUGLAS W

ART UNIT PAPER NUMBER

2811

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/813,834

Applicant(s)

ROH ET AL.

Examiner

Douglas W Owens

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1 – 9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 5 recite the limitation, "...wherein the self-aligned contact hole does not overlap any part of the first and second conductor structures." There is nothing in the specification prohibiting the self-aligned contact hole from overlapping the first and second conductor structures.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 5 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent No. 5,547,888 to Yamazaki.

Regarding claims 1 and 5, Yamazaki teaches an asymmetrical semiconductor device, (Fig. 10, for example; see abstract also) comprising:

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a substrate (1) having impurity regions;

a first and second conductor structure (3,4);

an insulator structure (8) on the first and second conductor structure and on the substrate except over the substrate in a region between the first and second conductor structures;

sidewall spacers (31a), each sidewall spacer being formed to abut against both a side of the first or second conductor structures and a side of the insulator structure such that a vertical portion of each sidewall spacer abuts the conductor structures, the sidewall spacers manifesting the self-aligned contact hole in the region between the first and second conductor structures, wherein the self-aligned contact hole does not overlap any part of the first and second conductor structures; and

second sidewall spacers (6D) on sides of the first and second conductor structures opposite of the self-aligned contact hole.

Regarding claim 2, Yamazaki teaches a semiconductor device, wherein the first and second conductor structures are gate structures.

Regarding claim 6, Yamazaki teaches a semiconductor device, wherein the ion concentration of a first impurity region is different than the ion concentration of a second impurity region (Col. 8, lines 22 – 25).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4, and 7 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki.

Regarding claims 4 and 7, Yamazaki teaches a semiconductor device further comprising a contact structure (10S) in the self-aligned contact hole, wherein the contact structure is in contact with the first sidewall spacer and the first impurity region. Yamazaki does not explicitly teach the contact structure is a plug. Yamazaki is silent with respect to the preferred type of contact structure (Col. 7, lines 51 – 58). It is common in the art to form plugs in contact holes for the purpose of providing electrical connection to a node in a substrate. It would have been obvious to one of ordinary skill in the art use a plug since it is desirable to provide reliable contact structures.

Regarding claim 8, Yamazaki does not teach a device, wherein the plug is in contact with a bit line. Bit lines are inherently taught in Yamazaki, since bit lines are required in SRAM structures for the purpose transferring bits of data. It would have been obvious to one having ordinary skill in the art to electrically connect the contact plug to a bit line, since the bit line must necessarily be in electrical communication with the active devices.

Regarding claim 9, Yamazaki does not teach a device, wherein the contact plug is not disposed directly above the first and second conductor structures. If one having ordinary skill in the art had incorporated the suggested contact plug, it would not have been disposed above the first and second conductive structures since a typical contact plug would not extend out above the conductive structures.

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7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki as applied to claim 1 above, and further in view of US patent No. 5,602,410 to Schwalke et al.

Yamazaki teaches a semiconductor device, wherein the first and second conductor structures comprise:

a gate oxide layer (3); and

a conductive layer (4).

Yamazaki does not teach a cap insulating layer on the conductive layer. Schwalke et al. teach a gate including a cap insulating layer (Fig. 6; (50)). It would have been obvious to one having ordinary skill in the art to incorporate the teaching of Schwalke et al. into the device taught by Yamazaki since it is desirable to protect the gate from implantation (see Schwalke et al., Col. 4, lines 15 – 20), as well as additional processing steps.

Response to Arguments

8. Applicant's arguments filed October 14, 2003 have been fully considered but they are not persuasive.

The Applicant argues that Yamazaki does not teach sidewall spacers formed to abut against both a side of the first or second conductor structure and a side of the insulator structure, such that a vertical portion of the spacers abuts the conductor structures, the sidewall spacers manifesting the self-aligned contact hole wherein the self-aligned contact hole does not overlap any part of the first and second conductor structures. This teaching can be seen in figure 10 of Yamazaki. Claims 1 and 5 require

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that a *vertical portion* of each sidewall spacer abuts the conductor structures (emphasis added). It can be seen that a vertical portion of the sidewall spacer (31a) abuts the conductor structures. It can further be seen in figure 10 of Yamazaki that the contact hole lies between sidewall spacers (31a), and the contact hole does not overlap the conductor structures.

As conceded in the prior Office Action, Yamazaki does not explicitly teach that the contact structure is a plug. It is common in the art to use a plug as a contact structure since it is desirable to form reliable connections. The Applicant has requested evidence in the art of the common use of a plug for a contact structure. See the following US patents, enclosed for the Applicant's convenience:

6,188,112 to Bryant, Fig. 4, Col. 2, lines 54 – 56;
5,998,249 to Liaw et al., Fig. 13, Col. 6, lines 2 – 7;
5,545,584 to Wu et al., Fig. 7, Col. 8, line 62 – Col. 9

9. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on 703-308-1690. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

DWO



EDDIE LEE
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